Name _____

Potato Investigation
25 pts

Introduction

Plants are adapted to their environments. We know that freshwater plants thrive in freshwater and saltwater-adapted plants thrive in saline water. Plants that live in saltwater have special cells to prevent dehydration. Find out what happens to a freshwater plant (potato) when it is exposed to a sudden change in salinity (saltiness).

Hypothesis

A. What do you think will happen to the mass of potato slices that are put in freshwater?

B. What do you think will happen to the mass of potato slices that are put in saltwater?

Procedures

1. Fill Beaker A (no salt) with 250 mL of tap water.
2. Fill Beaker B (with salt) with 250 mL of tap water and stir.
3. Find the mass of 3 separate potato slices and record each in your table.
4. Put each potato slice in its appropriate environment (on the paper towel, in the freshwater of Beaker A, in the saltwater of Beaker B).
5. Every 5 minutes, find the mass of each potato slice and record. **Be sure to dab off excess water BEFORE putting each slice on the scale.**
6. After 20 minutes, record the mass of each potato slice again and then return them to their environments overnight.
7. Record your final mass of each potato slice the next day.
8. **Calculate** the change in mass by subtracting the starting mass from the final mass. Be sure to note if the change is **positive or negative**!
9. Answer the analysis questions based on your findings.

Osmosis Info

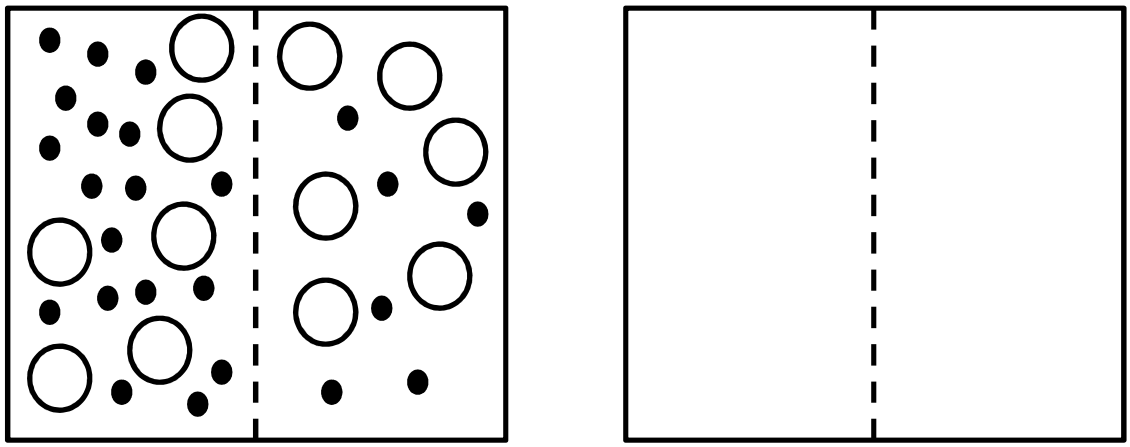
Aquatic environments are all about water and the movement of molecules in it. If a substance dissolved in water is more concentrated in one area, it will spread out until all areas have the same concentration of that substance. This is called ***diffusion***.

Organisms, like plants and animals, have cells that are protected by membranes. These cell membranes allow some things to enter and exit but not everything. Such membranes are called ***semi-permeable***, meaning only some things can get through while others cannot. The net movement of water through a semi-permeable membrane from an area of high concentration to an area of low concentration is called ***osmosis***.

At the cellular level of organisms, osmosis plays an important role in how much water (and everything else) goes in and out of cells. The cell membrane surrounding the cell allows water to pass through, both into and out of the cell. It also allows certain other molecules to enter easily and others to exit easily. The cell membrane can regulate what goes in or out by serving as a gatekeeper—it has holes that allow only molecules of certain sizes to pass through.

Osmosis is the diffusion of water through a semi-permeable membrane. Osmosis allows cells to keep certain molecules in and keep others out, while allowing still other molecules to flow back and forth depending on the concentrations inside and outside the cell. In a ***hypertonic solution***, the concentration of solutes outside the cell is higher than the concentration of solutes inside the cell. This means there is a lower concentration of water outside the cell, which causes water to flow out of the cell to establish equilibrium. In a ***hypotonic solution***, there is a lower concentration of solutes outside the cell than inside the cell. Therefore, there is a higher concentration of water outside the cell, so water flows into the cell to establish equilibrium. In an ***isotonic solution***, the concentrations of solutes and water are the same on both sides of the cell membrane, so the cell will neither swell nor shrink.

Imagine the small, black circles below are water molecules. The large, white circles represent a solute that cannot travel through the membrane (dotted line). In the rectangle on the right, draw what each side would look like if the water molecules moved through the membrane by osmosis to balance the concentration on each side.



Data

	Paper Towel No Water	Beaker A Freshwater	Beaker B Saltwater
Starting Mass (g) (0 minutes)			
5 minute Mass (g)			
10 minute Mass (g)			
15 minute Mass (g)			
20 Minute Mass (g)			
Final Mass (g)			
Change in Mass (g) (Final – Starting)			

Analysis

Answer the following questions by circling the correct terms in parentheses.

1. The mass of the potato slice on the paper towel (increased, decreased) because water moved (into, out of) the potato slice.
2. The mass of the potato slice in the freshwater (increased, decreased) because water moved (into, out of) the potato slice.
3. The mass of the potato slice in the saltwater (increased, decreased) because water moved (into, out of) the potato slice.

Define the Following Terms:

4. Diffusion:

5. Semi-permeable:

6. Osmosis:

7. Hypertonic solution:

8. Hypotonic solution:

9. Isotonic solution:

Apply what you learned about the potato slices to these real world scenarios by answering the following questions.

10. What might happen to the plants in a freshwater wetland if saltwater from an estuary or the ocean suddenly flooded it? Explain your answer.

11. Why do grocery stores spray their fresh produce with water?

12. If a shipwrecked crew drank salt water, they could die. Explain why.

13. If a bowl of fresh strawberries is sprinkled with sugar, a few minutes later they will be covered with juice. Explain why this happens.